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LOW LEVEL LASER THERAPY (LLLT)

What is LLLT?

- LLLT is a hair growth promoting treatment that relies on the use of red light, typically of wavelengths around 655 nm
- It has long been known that red light can stimulate hair growth
- The first LLLT device was cleared for use by the US Food and Drug Administration (FDA) in 2007.

What are the types of laser devices on the market?

- Lexington International's HairMax LaserComb series, including the:
 - HairMAX Professional 12 Laser Comb: Used 8 minutes three times weekly
 - HAIRBAND-82. Used 90 seconds three times weekly
- MEP 90 stationary hood
- Theradome laser helmet
- Apira iGrow laser helmet.
- NutraLuxe
- HairLabs International Inc
- Capillus (Capillus 272 Pro Helmet),
- LaserCap Company

How does LLLT actually work?

- The mechanism by which LLLT promotes hair growth is not fully understood
- Although it is often said that these devices 'increase blood flow' this is probably too simplistic of an explanation and not the actual reason by which growth occurs.
- It appears that deep within hair follicle cells there are tiny organelles known as mitochondria that are targets of the red light laser.
- Specifically, cytochrome C oxidase (CCO) has been proposed to be the key molecule that absorbs the red light energy.

Are there scientific studies to support its effectiveness?

- To date, there are 5 randomized double blind studies that support the benefits of low level laser in treating androgenetic hair loss (male pattern hair loss). These include 3 with helmet type device and 2 with laser combs
- These studies compare the benefits of a real laser device against a 'fake' or 'sham' device (sometimes called a placebo)
- All five RCTs report changes in hair density at 16 to 26 weeks with LLLT compared to sham devices
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What are types of hair loss can LLLT be used for?

- Male pattern hair loss is the main type of hair loss that has been studied and the type of hair loss for which this technology was cleared.
- The use of LLLT in the treatment of alopecia areata and chemotherapy induced hair loss continues to be studied.

What are the side effects of low level laser?

- A minor degree of warmth can be felt on the scalp
- Some patients experience hair shedding for the first 8 weeks

Dr. Donovan – Articles on LLLT

ARTICLE 1: Low Level Laser Therapy in Real Practice:



There are many treatments for androgenetic hair loss (female pattern hair loss). That said, there are only a limited number of treatments with good scientific evidence to back them up. With the publication of an independent study in the *American Journal of Clinical Dermatology* last January regarding the benefit of the HairMax Laser Comb, I've been increasingly incorporating these devices into my treatment algorithms for men and women.

Researchers from Brazil and Switzerland recently performed a study to evaluate the benefit and safety of the HairMax Laser Comb for treating androgenetic hair loss, either as a solo stand alone treatment or in combination with other treatments. Patients from the authors' practices used the HairMax laser combs and were assessed with global photographic imaging.

Of 32 patients (21 female, 11 male), 8 (25 %) showed significant, 20 (62.5%) moderate, and 4 (12.5%) had no improvement. Improvement was seen both with monotherapy and with concomitant therapy and observed as early as 3 months. There were no side effects.

The HairMax Laser Comb provides benefits

This is yet another of a growing number of independent post marketing studies to support the role of the HairMax laser comb for treatment of both male and female AGA. Treatments appear synergistic and additive and further studies are needed to understand how combination treatments with minoxidil, finasteride, and LLLT may enhance hair growth.

Reference

Munck A et al. Use of low-level laser therapy as monotherapy or concomitant therapy for male and female androgenetic alopecia. *Int J Trichology* 2014; 6: 45-9

ARTICLE 2: What's special about red light in promoting hair growth?



This perfect rainbow reminds us all that light is made up of many different wavelengths ranging from 400 nm to 700. Wavelengths around 650 nm produce red light.

Like many things in medicine, the use red light for hair growth came by chance. In the late 1960s, Dr Endre Mester, a Hungarian physician was studying whether a 694 nm ruby laser would cause cancer in mice. To his surprise, the laser did not cause cancer but rather dramatically stimulated hair growth!

It remains unclear exactly how red light stimulates hair growth. It appears that red light stimulates tiny organelles inside cells called mitochondria. A specific molecule known as cytochrome C oxidase (which is part of the mitochondria's cellular respiratory chain) has been proposed to be a key receptor molecule to absorb the red light and start the entire process.

To date, there have been 5 randomized double blind controlled trials studying the use of red light low level laser treatment (at 655 nm) for individuals with androgenetic alopecia. These include 2 studies with a laser "comb" device and 3 with a laser "helmet/cap" device. All studies showed improvement by 16-26 weeks compared to a placebo (sham) device.

There are many unanswered questions about using low level laser therapy. Which device is best? Is 655 nm really the best wavelength? Is the current 3 times per week really the best? Are laser combs better than laser helmets or are helmets better than combs? These are all unknown at present.

ARTICLE 3: How do lasers help hair loss?

Although it is often explained that low level laser devices simply increase blood flow this is not really the precise mechanism. That's far too simple. Increasing blood flow via exercise, a hot towel or standing on one's head does not help hair loss.

The precise mechanism by which low level laser works has still to be fully understood. Laser acts at the cellular level to affect mitochondria inside cells to affect their production of a chemical known as ATP. Low level laser therapy also changes reactive oxygen species (ROS) inside cells and affects various transcription factors (which influences the messages that are exchanged deep inside the cell).

In short, low level laser therapy brings about a very complex array of biochemical and cellular changes. It's far more involved than simply altering blood flow.

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